

# Should you switch off or stay engaged?

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**Should You Switch off or Stay Engaged? The Consequences of Thinking about  
Work on the Trajectory of Psychological Well-Being over Time**

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### Abstract

This study examined how two different ways of being mentally engaged with work-related issues during evenings (affective rumination and problem-solving pondering) cause changes in psychological well-being over one year period. We conducted a three-wave longitudinal study with a time lag of six months between each wave. At the first measurement moment, participants filled out a survey over five consecutive working days assessing work-related affective rumination and problem-solving pondering during evenings. Exhaustion and health complaints were assessed at the first measurement moment as well as after six and after 12 months. The three waves of data obtained from a total of 123 participants with full-time and primarily mentally demanding jobs were analyzed using latent growth curve modeling (LGM). The results showed that affective rumination is a significant predictor of increase in exhaustion over time. Problem-solving pondering was not found to be a significant predictor of change in psychological well-being over time. These findings demonstrate that work-related rumination during evenings may lead to health problems over time depending on the type of rumination. It suggests that unlike affective rumination, problem-solving pondering during evenings has no influence on psychological well-being over time.

*Keywords:* psychological well-being, exhaustion, recovery, work-related rumination, problem-solving

Previous research consistently shows that repeated insufficient recovery from work results in resource depletion and impairs employees' well-being especially over extended periods of time (Rook & Zijlstra, 2006; Sonnentag & Zijlstra, 2006; Hobfoll & Shirom, 2001).

Psychological detachment as an essential recovery experience has been reported to be beneficial for well-being both in the short and long run (e.g. Sonnentag, Kuttler, & Fritz, 2010; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag & Bayer, 2005). Psychological detachment has been defined as the sense of being away from work situations and the ability to switch off mentally from work (Etzion, Eden, & Lapidot, 1998; Sonnentag & Bayer, 2005). The lack of psychological detachment during off-job time implies to be mentally occupied with work stressors by thinking about work-related issues. The repeated or chronic activation of the cognitive representation of stressors is defined as perseverative cognition (Brosschot, Pieper & Thayer, 2005). According to Brosschot, Gerin, and Thayer (2006), perseverative cognition acts as the core feature of rumination that links stress exposure to impaired health.

Cropley and Zijlstra (2011) proposed two different types of work-related rumination labeled affective rumination and problem-solving pondering. Affective rumination is described as the experience of intrusive, pervasive and recurrent thoughts,

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in which attention is mainly directed to feelings related to work problems. Problem-solving pondering is described as prolonged thinking about possible solutions to a problem in order to progress toward choice of a solution (Pravettoni, Cropley, Leotta, & Bagnara, 2007). Cropley and Zijlstra (2011) proposed that these two qualities of work-related rumination may have different effects on the recovery process due to their diverging effects on psychophysiological arousal.

There are only a few studies that examined the relationship between these two types of work-related rumination and well-being (e.g. Querstret & Cropley 2012; Hamesch, Cropley, & Lang, 2014; Syrek, Weigelt, Peifer, & Antoni, 2016). Although, these studies indeed suggest differential relationships between affective rumination and problem solving on well-being, little is still known about their long-term health consequences. Particularly in the long run, affective rumination may result in cumulative effects on well-being by chronically depleting resources over time (Frese & Zapf, 1988; Sluiter, Frings-Dresen, Van Der Beek, & Meijman, 2001), whereas problem-solving pondering may reduce cumulative effects on well-being by producing psychological resources over time (Fredrickson & Joiner, 2002). Therefore, in this study, we investigate how the two different ways of being mentally engaged with work-related issues during evenings influence the trajectory of well-being over a one year period.

Our study makes several contributions to the recovery literature. First, it extends the recovery literature by examining the long-term accumulative effects of recovery during evenings of the working week on well-being. Second, in contrast to previous research, the present study examines the idea that the lack of detachment is not necessarily a threatening factor for well-being, depending on the type of work-related rumination. Finally, to fully capture both work-related and general factors of well-being, we include two long-term well-being outcomes: exhaustion and general mental health complaints. According to Warr (1987), when investigating employees' well-being in the long run, a distinction should be drawn between 'context-specific' and 'context-free' mental health. Context-specific mental health refers explicitly to job-related mental health such as exhaustion. In contrast, context-free mental health is a more global construct that is not tied to a specific context and reflects the general status of well-being. Therefore, our study contributes to occupational health literature by differentiating between these two well-being outcomes.

### **Work-Related Affective Rumination vs. Problem-Solving Pondering**

Rumination is conceptualized as “a class of conscious thoughts that revolve around a common instrumental theme and that recur in the absence of immediate environmental demands requiring the thoughts” (Martin, & Tesser, 1996, p. 7). Cropley and Zijlstra (2011) argued that people may engage in qualitatively different types of

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work-related rumination, namely affective rumination and problem-solving pondering. They state that affective rumination and problem-solving pondering have different effects on the recovery process because of their differential impact on psychophysiological arousal. Whereas, affective rumination causes prolonged psychophysiological activation that has straining effects on the organism, problem-solving pondering may only lead to a short lasting psychophysiological activation (Cropley & Zijlstra, 2011). To develop a conceptualization of different effects of affective rumination and problem-solving pondering on prolonged activation and well-being, we draw on the Cognitive Activation Theory of Stress (CATS: Ursin & Eriksen, 2004).

CATS (Ursin & Eriksen, 2004) is a comprehensive theory of stress that proposes that dealing with stressors leads to varying degrees of psychophysiological arousal depending on the response outcome expectancies. Response outcome expectancies are defined as individuals' estimates about the outcomes of their given responses. CATS distinguishes between negative and positive outcome expectancies depending on whether the produced response is expected to handle the situation with negative or positive results, respectively. Accordingly, negative outcome expectancies lead to sustained arousal especially when individuals do not see a solution to the problem. This heightened arousal will be sustained until the reason for the arousal has been eliminated. Moreover, sustained arousal occurs when one continues to endorse the negative outcome expectancy by rumination (Eriksen, Murison, Pensgaard, & Ursin, 2005). According to CATS, hopelessness and helplessness are two negative response outcome expectancies that occur when there is no successful coping. Hopelessness occurs when individuals learn that their responses have led to negative results. Helplessness occurs when individuals perceive that their responses have not been effective in avoiding the aversive stimulus. It is assumed that both states threaten health through sustained arousal that has straining effects on the organism (Ursin & Eriksen, 2004; Meurs & Perrewe, 2011). Based on CATS, affective rumination leads to prolonged activation because there are negative outcome expectancies for solving problems and coping with the situation. Rumination exacerbates these negative expectancies over time and increases the perceived lack of control. When individuals establish the expectancy that they are not able to cope with the situation for instance by finding a solution or avoiding aversive thoughts, hopelessness and helplessness may occur. Cognitive models of clinical psychology conceptualized helplessness and hopelessness as the mechanisms by which anxiety and depression occur (Waikar & Craske, 1997; Henkel, Bussfeld, Möller, & Hegerl, 2002; Pryce et al., 2011; Vollmayr & Gass, 2013).

CATS defines coping as positive response outcome expectancies in which individuals believe that they are able to handle the situation with positive results (Ursin & Eriksen, 2010). Although individuals still experience a short-lasting activation or phasic arousal when handling a difficult or unfinished task, this level of arousal will be reduced

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as soon as a solution is found or a positive result achieved. Based on CATS, in terms of dealing with stressors, problem-solving pondering can function as a form of coping in which individuals think about work-related issues with positive outcome expectancies. Therefore, they have a feeling of being able to control the situation by finding a solution to the problem. Finding a solution and feeling a sense of control are both known as adequate ways of reducing arousal (Ursin & Eriksen, 2004).

### **Work-Related Affective Rumination and Psychological Well-Being**

Work-related affective rumination during evenings is likely to lead to a decrease in well-being in the long run for several reasons. When people ruminate affectively about work, they generally think repetitively about negative aspects such as failure or negative events (Binnewies, Sonnentag, & Mojza, 2009). Because in this way job stressors remain mentally present, it leads to prolonged activation (Brosschot et al., 2005). As a result, prolonged activation causes impaired well-being as it draws on individuals' resources during recovery time (Brosschot, van Dijk, & Thayer, 2002). In addition, ruminating about the negative aspects of work is associated with increased negative affect (Thomsen et al., 2004, Thomsen, Mehlsen, Christensen, & Zachariae, 2003) which influences well-being negatively in the long run (Finch, Baranik, Liu, & West, 2012, Mayne, 1999). Furthermore, according to Brosschot et al. (2006), affective rumination has a negative effect on health not only by prolonging the effects of a stressor but also by increasing its degree of uncontrollability. In fact, effortful thinking without finding a cognitive gain or solution results in prolonged experience of uncontrollability. Prolonged experience of uncontrollability is likely to lead to a decrease in well-being via causing impaired cognitive functioning such as the lack of attentional control (von Hecker & Sedek, 1999; Bukowski, Asanowicz, Marzecová, & Lupiáñez, 2015). It can also lead to health impairment by causing learned helplessness (Seligman, 1975) when there is no reduction of the initial uncertainty despite the individual's continuous cognitive effort (Sedek & Kofta, 1990; Kofta, 1993). Finally, affective rumination may affect health over a long time via its negative effects on health-related behavior. Previous studies showed that people engaging in much rumination have poorer health behaviors such as smoking, drinking, physical inactivity and sleep disturbance (Thomsen et al, 2004; Cropley, Dijk, & Stanley, 2006). Especially in the long run, these negative behaviors may lead to impaired well-being.

Previous research on rumination has mainly been conducted in the field of clinical psychology and focused predominantly on the emotional aspect of rumination. These studies showed that rumination is associated with a variety of psychological states such as anxiety (Mellings & Alden, 2000), depression and negative affect (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Thomsen et al., 2003), anger (Hogan & Linden, 2004), physiological and somatic symptoms (Brosschot et al., 2006), and poor sleep

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quality (Thomsen et al., 2003). Up to now, few studies investigated how work-related rumination influences well-being. In a cross-sectional study, Querstret and Cropley (2012) found that high levels of affective rumination were associated with high levels of acute and chronic fatigue. Another study by Donahue et al. (2012) found a positive relationship between work-related rumination and exhaustion reported by professional coaches. By using a longitudinal design of study on nurses, Donahue et al. (2012) reported the same results, indicating a positive relationship between work-related rumination and exhaustion after three months. In another study, Hamesch et al. (2014) found that in a sample of dental students, work-related affective rumination was positively related to depression measured after six months. In the present study we go beyond looking at the delayed effects of rumination by investigating whether the extent to which people experience affective rumination during evenings is related to the slope of psychological well-being over a one year period. We hypothesize that:

*Hypothesis 1: The experience of work-related affective rumination during evenings is positively related to the rate of change in exhaustion (a) and health complaints (b) over time.*

### **Work-Related Problem-Solving Pondering and Psychological Well-Being**

In contrast to affective rumination, problem-solving pondering during evenings may have long term positive effects on well-being for several reasons. Although problem-solving pondering during recovery time draws on individual's cognitive resources, it is likely to act as a resource-providing experience by producing positive affect. People may experience positive affect when they ponder about interesting work-related issues or positive aspects of work. Moreover, problem-solving pondering may result in the discovery of solutions that causes positive affect. Therefore, problem-solving pondering may improve well-being by producing positive affect (Seo, Barrett, & Bartunek, 2004). Especially in the long run, according to the broaden-and-build theory of positive emotions (Fredrickson, 1998), momentary experiences of positive emotions can trigger upward spirals towards well-being over time by building psychological resources (Fredrickson & Joiner, 2002). Furthermore, according to the self-regulation model of ruminative thought (Martin & Tesser, 1996), finding a solution as a goal attainment mechanism stops ruminative thinking processes. Then individuals have more time to engage in recovery experiences. Taking together, the experience of problem-solving pondering during off-job time may benefit individuals' well-being because it reduces the effect of work-related stressors and enhances their resources to deal with future stressors.

A few studies have addressed the effects of problem-solving pondering on well-being. In a cross-sectional study by Querstret and Cropley (2012), problem-solving pondering was associated with lower levels of acute and chronic fatigue. However, a

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longitudinal study using a student sample (Hamesch et al., 2014) did not find any significant effect of problem-solving pondering on depression. In the current study, we examine how the experience of problem-solving pondering during evenings influences the slope of psychological well-being over a one year period. We hypothesize that:

*Hypothesis 2: The experience of work-related problem-solving pondering during evenings is negatively related to the rate of change in exhaustion (a) and health complaints (b) over time.*

The research model is presented in Figure 1.

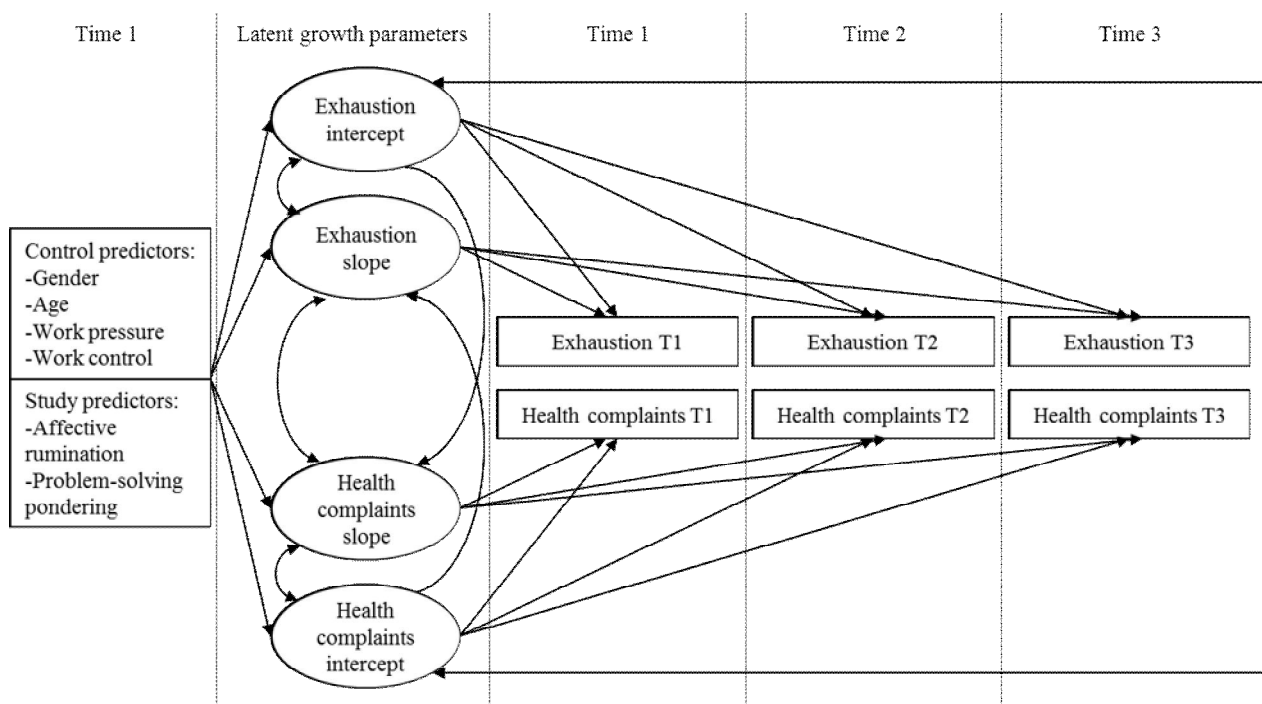


Figure 1. The conditional bivariate latent growth model of psychological well-being over time.

## Method

### Procedure and Sample

To test the hypotheses, we conducted a three-wave study with a time lag of six months between each wave. However, due to local circumstances the time window in which surveys could be filled in varied from one week earlier to one week later than the exact six months. At Time 1, participants were asked to fill in a general survey and five separate daily surveys administered over the working week. The general survey was used to collect demographic information and assess control variables and outcome variables.



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The daily survey assessed evening-level measures of work-related affective rumination and problem-solving pondering. Schlotz, Hellhammer, Schulz, and Stone (2004) demonstrated that individuals show higher levels of cortisol awakening response during working days compared with weekend days. This difference in cortisol awakening response is attributed to person-levels of work-related rumination. Therefore, the present study focuses only on rumination that people specifically experience during evenings of the working week. To capture this rumination, we conducted a diary study for a whole 5-day week. Moreover, we used the daily measurement because in this way participants would not have to remember over longer time periods to what extent they engaged in affective rumination or problem-solving pondering during evenings. We asked participants to complete the daily survey over a period of five consecutive working days before going to bed. To make sure that participants would not forget to complete the diary in the evening, brief reminder messages were sent on their cell phones. We used the average of five the Time 1 evening measures of work-related affective rumination and problem-solving pondering. At Time 2 and 3 participants were asked again to complete the general survey questionnaire measuring outcome variables.

Participants were recruited from a range of Iranian organizations, including two centers of health and social welfare services, a counseling center of a large university, the educational office and a faculty of a university, two high schools, and a couple of local branches of a bank. We sent a letter to the head of the organizations who informed their employees about the goal of the study as well as the daily and longitudinal nature of the surveys. In the letter we emphasized the anonymity and confidentiality of the data-collection and analysis process. The sample criteria were that each participant must work in a full-time and primarily mentally demanding job. Participants were offered to receive feedback about their results after completion of the data collection as an incentive for participation. Of the 240 distributed paper-and-pencil survey packages at Time 1, a total of 186 persons responded to the general and daily questionnaires. The group of participants, who had completed the Time 1 survey, received the second and third surveys, 6 months (Time 2) and then 12 months (Time 3) after the first measurement. At Time 2 and 3 participants were asked to fill out only the questionnaires measuring health complaints and exhaustion. 156 and 138 questionnaires were filled out and returned at Time 2 and Time 3, respectively. Seven participants were omitted owing to reported substantially negative events (e.g. death of a close relative or friend, starting a new job) over the one year study period. We also omitted the data from eight participants who responded to daily surveys over less than three working days. Hence, the data from a final sample of 123 participants were analyzed. Attrition analyses revealed that employees with higher levels of health complaints ( $t(184) = -2.22, p < .05$ ) at Time 1 were more likely to drop out from the study. However, there was no significant difference between dropouts and non-dropouts with respect to exhaustion ( $t(184) = -1.68, p = .09$ ), affective rumination ( $t(184) = -.91, p = .36$ ), and problem-solving pondering ( $t(184) = -$

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1.27,  $p = .21$ ), making it unlikely that attrition would have confounded the results (Goodman & Blum, 1996).

The final panel group ( $N = 123$ ) consisted of 61 female and 62 male employees working in different types of job (26% in health services, 45% in educational services and 29% in social services). The majority of the participants (84%) were married. At Time 1 age ranged from 21 to 54 years ( $M = 32.85$ ;  $SD = 5.82$ ). They were educated in a range of degrees from Basic Diploma to PhD (10% basic diploma, 9% associate, 50% bachelor, 25% master, and 6% PhD).

### Measures

Data were collected by conducting general and daily surveys. All items were in Persian. Items developed in English were translated into Persian by the first author and translated back to English by two interpreters to ensure conceptual consistency. Cronbach's alphas for all scales are displayed in Table 1.

**Exhaustion.** We assessed exhaustion with the related subscale of Oldenburg Burnout Inventory (OLBI; Demerouti, Mostert, & Bakker, 2010; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The subscale of exhaustion consists of 8 items (e.g., "During my work, I often felt emotionally drained") scored on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Scores were coded in such a way that higher scores indicate more exhaustion during the past few weeks.

**Health complaints.** To measure health complaints, we used the 12-item General Health Questionnaire (GHQ-12; Goldberg & Williams, 1988). GHQ-12 consists of 12 items that each one assesses the severity of a mental problem over the past few weeks (e.g., "I felt constantly under strain") on a 4-point scale from 0 (not at all) to 3 (much more than usual). Scores were coded such that higher scores indicate worse mental health.

**Work-related rumination.** We measured two different type of work-related rumination including affective rumination and problem-solving pondering each by five adapted items of The Work-Related Rumination Questionnaire (WRRQ; Cropley, Michalianou, Pravettoni, & Millward, 2012). Affective rumination and problem-solving pondering subscales included items such as, "During evening, I was irritated by work issues" and "During evening, I found solutions to my work-related problems", respectively. Items were responded by using a five-point Likert scale ranging from 1 (very seldom/never) to 5 (very often/always).

To test whether these two ruminative experiences represented distinct constructs, we ran a set of confirmatory factor analyses. Compared to the one-factor model ( $\chi^2(30) =$

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162.983,  $p < 0.001$ ; CFI = .80; TLI = .71; RMSEA = .19; SRMR = .16), the two-factor model ( $\chi^2(29) = 41.701$ ,  $p = .06$ ; CFI = .98; TLI = .97; RMSEA = .06; SRMR = .05) was found to fit the observed data at Day 1 significantly better ( $\Delta\chi^2(1) = 121.282$ ,  $p < .001$ ). The two-factor model was also the best fit to the data at Day 2, 3, 4, and 5.

To achieve the person-level of affective rumination and problem-solving pondering, we aggregated and averaged the five daily evening measures of them. In order to justify the aggregations and average across the five daily measurements, we estimated the two forms of the intraclass correlation coefficient: the ICC1 and ICC2 (Bliese, 2000, 2013). ICC1s' results revealed that 68% and 64% of variance, respectively, in affective rumination and problem-solving pondering lying between persons. Moreover, the ICC2s' values of .91 and .89 were found for affective rumination and problem-solving pondering, respectively. These estimates indicate that individuals can significantly (Bliese, 2013) be reliably differentiated in terms of the averages of affective rumination and problem-solving pondering.

**Job situation control variables.** Work pressure was assessed using 13-item work pressure subscale of Tilburg Work Pressure Questionnaire (T-WPQ; Roe & Zijlstra, 2000). Participants were asked to indicate the extent to which they agreed with each item (e.g., "During my work I feel urged or hurried") on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Participants with higher scores experienced greater work pressure. Work control was measured using the Job Control Questionnaire developed by Greenberger, Strasser, Cummings, and Dunham (1989). The job control questionnaire consists of 16 items about task control, organization control, and resource control (e.g., "How much influence do you have over the amount of work you do?"). The items were rated on a 5-point Likert scale ranging from 1 (very little) to 5 (very much), with higher scores reflecting greater job control.

## Analytical Model

The research hypotheses were examined using latent growth curve modeling (LGM; Duncan, Duncan, Strycker, Li, & Alpert, 1999; Kaplan, 2000). As a structural equation modeling approach to the analysis of longitudinal data, LGM is used to investigate within-person changes in outcome variables over time as well as between-subject differences in such changes (Muthén & Khoo, 1998). To do so, LGM estimates two latent growth curve parameters of outcome variables; the initial level (i.e., intercept) and the rate of change over time (i.e., slope). LGM then provides the possibility to examine the interactions between these two latent growth parameters, as well as their between-person differences across a set of predictors (Willett & Sayer, 1994).

The analyses were conducted using Mplus statistical software version 7 (Muthén & Muthén, 2012) and model fit was evaluated using five indicators: the Chi-square

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goodness of fit test; the comparative fit index (CFI; Bentler, 1990); the Tucker-Lewis index (TLI; also known as the non-normed fit index; Tucker & Lewis, 1973); the root mean square error of approximation (RMSEA; Steiger, 1990); and the standardized root mean square residual (SRMR; Hu & Bentler, 1999).

To analysis the data, we started with an unconditional univariate growth model of each outcome variable, by which we examined how exhaustion and general mental health changed over the one year period of study. Then, we tested the unconditional bivariate growth model (McArdle, 1988), suggested for the multivariate situation in which more than one growth model are simultaneously estimated at the level of the random slopes (Willett & Sayer, 1994). This allowed us to examine how changes in the two study outcome variables are associated with each other over time. Finally, we tested the conditional bivariate growth model. This model included gender, age, work pressure, and work control as the control variables. We also entered affective rumination and problem-solving pondering about work-related issues during evenings as the core predictors of four latent growth factors, as displayed in Figure 1.

Table 1  
*Mean, Standard Deviation, and Correlations for the Study Variables*

| Variable                      | <i>M</i> | <i>SD</i> | $\alpha$ | 1     | 2    | 3     | 4     | 5     | 6      | 7     | 8     | 9     | 10   | 11    | 12 |
|-------------------------------|----------|-----------|----------|-------|------|-------|-------|-------|--------|-------|-------|-------|------|-------|----|
| 1. Gender                     | 0.48     | 0.50      |          | -     |      |       |       |       |        |       |       |       |      |       |    |
| 2. Age                        | 32.85    | 5.80      |          | -.12  | -    |       |       |       |        |       |       |       |      |       |    |
| 3. Time 1 exhaustion          | 2.26     | 0.48      | .80      | .22*  | -.12 | -     |       |       |        |       |       |       |      |       |    |
| 4. Time 2 exhaustion          | 2.34     | 0.52      | .87      | .25** | -.09 | .61** | -     |       |        |       |       |       |      |       |    |
| 5. Time 3 exhaustion          | 2.41     | 0.45      | .75      | .33** | -.03 | .32** | .36** | -     |        |       |       |       |      |       |    |
| 6. Time 1 health complaints   | 0.81     | 0.37      | .79      | .16   | -.16 | .57** | .43** | .31*  | -      |       |       |       |      |       |    |
| 7. Time 2 health complaints   | 0.91     | 0.49      | .86      | .25** | -.13 | .37** | .69** | .37** | .52**  | -     |       |       |      |       |    |
| 8. Time 3 health complaints   | 0.97     | 0.46      | .85      | .27** | .08  | .17   | .23** | .65** | .22*   | .33** | -     |       |      |       |    |
| 9. Work pressure              | 2.74     | 0.67      | .79      | .12   | -.07 | .49** | .44** | .29** | .33**  | .33** | .21*  | -     |      |       |    |
| 10. Work control              | 3.10     | 0.62      | .87      | -.12  | .20* | -.19* | -.12  | -.23* | -.25** | -.05  | -.02  | .02   | -    |       |    |
| 11. Affective rumination      | 1.92     | 0.66      | .87      | .09   | .09  | .15   | .25** | .31** | .28**  | .27** | .30** | .35** | -.05 | -     |    |
| 12. Problem-solving pondering | 2.33     | 0.69      | .90      | -.04  | .005 | -.09  | -.08  | .03   | -.03   | -.02  | .08   | .20*  | .11  | .35** | -  |

*Note.* Cronbach's alphas for variables measured daily are mean internal consistencies averaged over all measurement days. All correlations are at the person-level ( $N=123$ ). Gender (male = 0, female = 1). \*  $p < .05$  (two-tailed). \*\*  $p < .01$  (two-tailed).

## Results

Table 1 presents the means, standard deviations, Cronbach's alphas, and correlations for all predictors and Time 1, Time2, and Time3 measures of exhaustion and

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general health complaints. The mean levels of both exhaustion and health complaints show an increasing trajectory over time. In addition exhaustion and health complaints are positively correlated both within and across waves of measurements.

### Testing the Unconditional Univariate Growth Model of Psychological Well-Being over Time

Before conducting the latent growth models, the factorial invariance (Chan, 1998) was tested with a longitudinal covariance structure model. To do so, we compared a model with the factor loading freely estimated to a model with the factor loading constrained for each outcome construct separately. No significant chi-square difference statistic was found between the two models for either exhaustion ( $\Delta\chi^2(2) = 1.424, p = .491$ ) or health complaints ( $\Delta\chi^2(2) = 4.711, p < .095$ ). These findings indicate that the both constructs are factorially invariant across time.

The first step in the latent growth model analysis was to examine how exhaustion and health complaints changed over the three waves of measurements. The linear latent growth model of exhaustion was found to fit the observed data quite well  $\chi^2(1) = .016, p = .89$ ) with the acceptable fit indices of CFI = 1.0., TLI = 1.0. RMSEA = .00 [.00; .108], and SRMR = .003. Statistically, a value of .95 or greater on the CFI and TLI, .06 or lower on the RMSEA, and .08 or lower on the SRMR, indicate an acceptable model fit (Hu & Bentler, 1999). Moreover, the linear model of exhaustion resulted in significant mean intercept ( $M_i = 2.26, p < .001$ ) and slope ( $M_s = .078, p < .01$ ). These estimates indicate that the average score of exhaustion at time 1 was 2.26 (the intercept), and there was a significant and steady increase in exhaustion, on average, by .078 (the slope) over the subsequent twelve months. The variances for the intercept and slope were  $V_i = .241, p < .001$  and  $V_s = .05, p < .01$ , respectively, indicating significant variation across individuals in terms of initial status of exhaustion and its rate of change over time. In addition there was a significant negative correlation ( $r = -.78, p < .001$ ) between the intercept and slope of exhaustion, indicating that lower initial values were associated with higher rates of change in exhaustion over time.

The linear latent growth model of health complaints was then tested. The model produced an acceptable Chi-square test statistic,  $\chi^2(1) = .245, p = .62$ , and fit indices, CFI = 1.0., TLI = 1.0., RMSEA = .00 [.00; .189], and SRMR = .012, indicating a very good fit to the data. This linear growth model showed significant means of intercept ( $M_i = .81, p < .001$ ) and slope ( $M_s = .084, p < .001$ ), indicating that on average over all participants health complaints showed a systematic increase over time. Further, there was significant variance in both intercept ( $V_i = .147, p < .01$ ) and slope ( $V_s = .044, p < .01$ ), indicating there was substantial individual variability about the initial level of health complaints and its rate of change over time. Finally, the correlation between the intercept

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and slope was found significant ( $r = -.67, p < .001$ ), indicating that lower initial levels of health complaints were associated with steeper increases over time.

Additional test revealed no significant quadratic trend in the slope for both exhaustion and health complaints.

### **Testing the Unconditional Bivariate Growth Model of Psychological Well-Being over Time**

The second step of analysis was evaluating the interrelations between exhaustion and health complaints growth models. A bivariate latent growth model was estimated to examine how the initial statuses and increasing trajectories of exhaustion and health complaints were associated. The bivariate growth model yielded a Chi-square statistic of  $\chi^2(7) = 4.569, p = .60$  and fit indices, CFI = 1.0., TLI = 1.0., RMSEA = .00 [.00; .10], and SRMR = .043, indicating a significant acceptable model. The results of the bivariate model showed that the initial levels of the two outcomes were significantly positively correlated ( $r = .60, p < .001$ ). This means that high initial levels of exhaustion were associated with high initial levels of health complaints. The rate of change in the two health outcomes was also significantly and positively correlated ( $r = .68, p < .001$ ). This indicates that an individual's growth trajectory on exhaustion was very similar to that same individual's growth trajectory on health complaints. In other words, changes in exhaustion were significantly correlated with changes in health complaints. Furthermore, there were significant correlations between the intercept of exhaustion and the slope of health complaints ( $r = -.29, p < .05$ ), and also between the intercept of health complaints and the slope of exhaustion ( $r = -.31, p < .01$ ). These findings indicate that higher initial levels of one health outcome were negatively associated with lower rates of change in another health outcome over time.

### **Testing the Conditional Bivariate Growth Model of Psychological Well-Being over Time**

In the final step of the analysis, covariates were simultaneously included in the bivariate model to evaluate their effects on the four latent growth factors of exhaustion and health complaints. The findings are presented in Table 2. The model produced a good fit to the data ( $\chi^2(18) = 14.829, p = .67$  and fit indices, CFI = 1.0., TLI = 1.0., RMSEA = .00 [.00; .065], and SRMR = .032).

As Table 2 shows, gender was only significantly related to the slope of health complaints ( $\beta = .23, p < .05$ ) suggesting that compared to males, females experienced a steeper increase in health problems over time. Age was significantly related to neither intercepts nor slopes of both health outcomes. Work pressure was significantly related to both intercept ( $\beta = .54, p < .001$ ) and slope ( $\beta = -.35, p < .01$ ) of exhaustion. These

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findings indicate that although subjects with higher levels of work pressure reported higher initial levels of exhaustion, they experienced flatter trajectories of exhaustion over time. Work pressure was also significantly related to the intercept of health complaints ( $\beta = .28, p < .01$ ), indicating that individuals with higher levels of work pressure reported higher initial levels of health complaints. Work control was found to be significantly related to the intercept of health complaints ( $\beta = -.21, p < .05$ ), suggesting that employees who reported higher levels of work control experienced lower initial levels of health complaints.

Table 2

*Conditional Bivariate Growth Model of Psychological Well-Being with Covariates*

| Variable                  | exhaustion     |                 | Health complaints |               |
|---------------------------|----------------|-----------------|-------------------|---------------|
|                           | Intercept      | Slope           | Intercept         | Slope         |
| Gender                    | 0.12 (1.43)    | 0.13 (1.27)     | 0.06 (0.68)       | 0.23* (2.24)  |
| Age                       | -0.03 (-0.35)  | 0.06 (0.63)     | -0.12 (-1.45)     | 0.18 (1.61)   |
| Work pressure             | 0.54*** (5.71) | -0.35** (-2.95) | 0.28** (2.75)     | -0.11 (-0.84) |
| Work control              | -0.17 (-1.73)  | 0.005 (0.04)    | -0.21* (-2.84)    | 0.19 (1.77)   |
| Affective rumination      | 0.01 (0.12)    | 0.23* (2.15)    | 0.22* (2.16)      | 0.07 (0.61)   |
| Problem-solving pondering | -0.19* (-2.50) | 0.13 (1.19)     | -0.14 (-1.54)     | 0.09 (0.92)   |

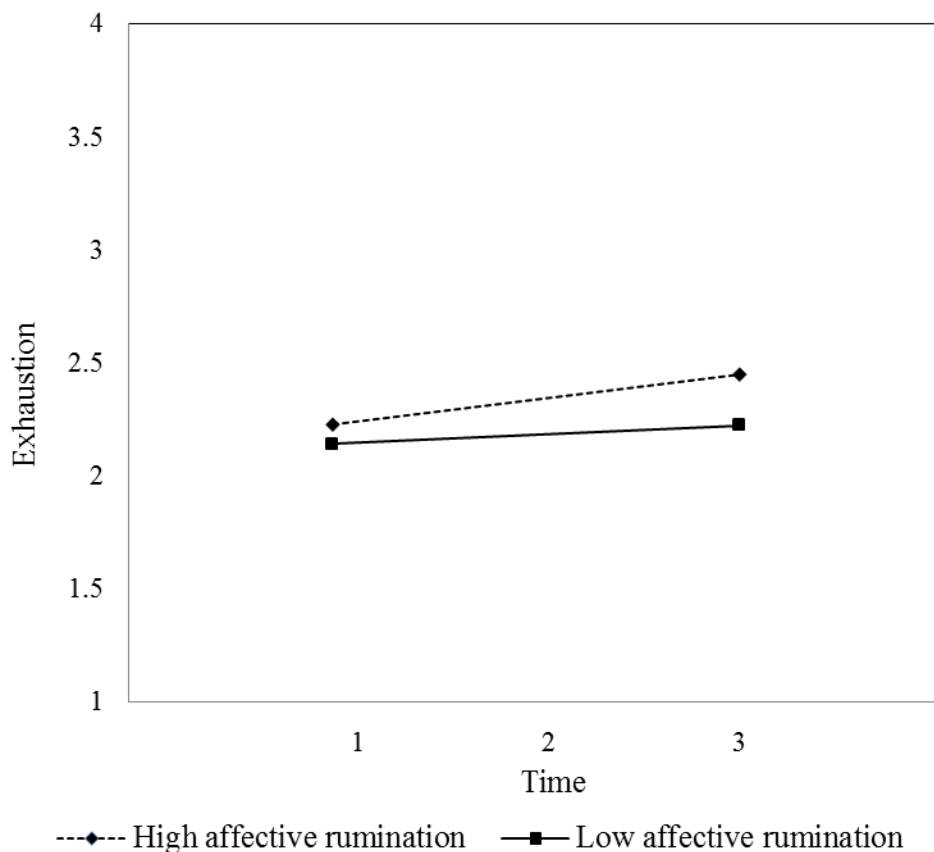
*Note.* All effects are presented using standardized parameter estimates. \*  $p < .05$  (two-tailed). \*\*  $p < .01$  (two-tailed). \*\*\*  $p < .001$  (two-tailed). Number in parenthesis is the ratio of the parameter estimate to standard error. Gender (male = 0, female = 1).  $N = 123$ .

Table 2 also shows the results related to the two experiences of work-related rumination. The relationship between affective rumination and the initial level of exhaustion was not found significant. However, there was a significant relationship between the experience of work-related affective rumination during evenings and the initial level of health complaints ( $\beta = .22, p < .05$ ). This indicates that individuals who experienced higher levels of affective rumination during evenings reported higher initial levels of health complaints. The results also showed that affective rumination was significantly associated to the rate of increasing change in exhaustion ( $\beta = .23, p < .05$ ) over time. This finding indicates that people who experienced higher levels of work-related affective rumination during the time of recovery in evenings showed a steeper trajectory of growth in exhaustion over time (Figure 2). Hypothesis 1a was then supported. Nevertheless, the results showed that affective rumination during evenings was not a significant predictor of the slope of health complaints over time. Therefore, Hypothesis 1b was not supported.

The results related to the work-related problem solving pondering during evenings showed a negative and significant relation with the intercept of exhaustion ( $\beta = -.19, p < .05$ ), and a negative but non-significant relation with the intercept of health complaints ( $\beta = -.14, p = .12$ ). This finding indicates that individuals who experienced higher levels of

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problem-solving pondering during evenings reported lower initial levels of exhaustion. Furthermore, problem solving pondering was not found as the significant predictor of either slope of health outcomes. Therefore Hypothesis 2 was not supported.



*Figure 2.* Growth trajectories of exhaustion over time at different levels of work-related affective rumination during evenings

## Discussion

In this 3-wave longitudinal study, we investigated how the experience of work-related affective rumination and problem-solving pondering during evenings influence employees' well-being over time. Latent growth curve modeling (LGM) was used to examine the hypotheses. We hypothesized that the experience of work-related affective rumination during evenings is positively related to the growth rate of change in exhaustion and health complaints over time (Hypothesis 1). In contrast, we expected that the experience of work-related problem-solving pondering during evenings is negatively related to the growth rate of change in exhaustion and health complaints over time



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(Hypothesis 2). Hypothesis 1 was partially supported and Hypothesis 2 was not supported.

The conditional bivariate growth model of psychological well-being showed that work-related affective rumination was positively associated with the initial level of health complaints. This finding indicates that employees who experienced lower levels of mental health reported simultaneously higher levels of affective rumination. From the clinical point of view, the current finding replicates findings from previous cross-sectional studies (e.g. Hughes, Alloy, & Cogswell, 2008; for a review, see Thomsen, 2006), demonstrating that intrusive and negative rumination is associated with depression and anxiety symptoms. However, the positive relation between affective rumination and the initial level of exhaustion was not significant. This results stands in contrast to findings of previous cross-sectional studies (e.g. Querstret & Cropley, 2012; Donahue et al., 2012). One potential explanation for this result is that people generally have resources to deal with affective rumination for a limited period of time; however, affective rumination leads to exhaustion by drawing on resources over a period of time (Sonnentag, Binnewies et al., 2010). Moreover, work-related problem-solving pondering showed a negative relation with the intercept of exhaustion. This finding is consistent with findings of a cross-sectional study (Querstret & Cropley, 2012) that showed participants reporting higher levels of problem-solving pondering reported simultaneously lower levels of work-related fatigue. A possible explanation for this effect is that because engaging in problem solving pondering requires mental energy, individuals with low energy levels are less likely to engage in problem solving pondering. Demerouti and her colleagues (2010) found that exhaustion is negatively related to vigor. Vigor is characterized by high levels of energy and willingness to invest effort (Schaufeli & Bakker, 2004). Accordingly, employees with lower levels of exhaustion are more likely to engage in problem-solving pondering.

Our results showed that work-related affective rumination during evenings was a significant predictor of increase in exhaustion across a period of 12 months. This finding is in line with a past research that found a positive relationship between affective rumination and exhaustion after three months (Donahue et al., 2012). This finding extends the recovery literature by showing how the insufficient recovery during evenings influences well-being over time. According to Cropley and Zijlstra (2011), affective rumination leads to prolonged activation because it draws not only on cognitive resources but also on emotional resources. Therefore, as the consequence of prolonged activation and draining of emotional resources, exhaustion occurs (Sonntag, Binnewies et al., 2010). However, our study showed that affective rumination was not a significant predictor of change in general mental health over time. This result was in contrast to a prior study (Hamesch et al., 2014) that found that affective rumination was positively associated with depressive mood that individuals reported after six months. These

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findings suggest that work-related affective rumination only impairs work-specific mental health over time. A possible explanation is that whereas exhaustion is mainly affected by work-related factors, impairment of general mental health may also be caused and modified by other life conditions, such as illness, economic circumstances and the family situation. Therefore, these findings also contribute to the psychological health literature by demonstrating that “work-specific” and “context-free” mental health are two distinct constructs (Warr, 1987), as their patterns of associations with work-related affective rumination were different.

Our results did not show a significant relationship between problem-solving pondering during evenings and changes in either indicator of psychological well-being over time. This finding is also in line with past research (Hamesch et al., 2014) suggesting that problem-solving pondering is less detrimental to well-being than affective rumination. According to Nolen-Hoeksema (1996), the key feature in determining the effectiveness of problem-solving is whether progression in thoughts occurs over a reasonable period of time. Therefore, although it is assumed that problem-solving facilitates the recovery process by causing positive affect and increasing the likelihood that solutions are found; it may conversely impede the recovery process when employees continuously think about their work problems without any progression in finding solutions. Future research is needed to investigate circumstances under which problem-solving pondering facilitates or conversely impedes the recovery process during non-work time.

These findings are consistent with the assumption that the two types of work-related rumination may operate differently on recovery process and in turn have different effects on well-being (Cropley & Zijlstra, 2011). This suggests that in contrast to affective rumination, problem-solving pondering during evenings is not a risk factor for impaired well-being in the long-run. According to Brosschot et al. (2005), rumination leads to prolonged activation as a risk factor of health problems by maintaining an active cognitive representation of individuals’ job stressors. However, this study showed that it is not necessarily being mentally engaged with job-stressors per se that causes prolonged activation during off-job time. Drawing on CATS theory (Ursin & Eriksen, 2004; Ursin & Eriksen, 2010), dealing with job-stressors causes prolonged activation only when individuals experience negative outcome expectancies. Affective rumination is likely to be associated with negative outcome expectancies in which individuals believe that their responses are not expected to handle the situation and they may even lead to negative results. In contrast, problem-solving pondering does not lead to prolonged activation because it is likely to be associated with positive outcome expectancies in which individuals believe that their responses are expected to handle the situation with positive results.

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As an additional finding, our results showed a significant increase in impaired well-being over time. According to Schaufeli, Leiter, and Maslach (2009), people in developing countries are more likely to become exhausted because of rapid changes in modern working life such as increasing demands of learning new skills, the need to adopt new types of work, pressure of higher quality of work, and time pressure. Moreover, the results of bivariate growth model showed a positive correlation between the rate of change in exhaustion and health complaints over time. This finding contributes to the previous literature investigating the link between mental health and exhaustion (e.g. Demerouti et al., 2010; Maslach, Schaufeli, & Leiter, 2001) by indicating that changes in exhaustion and mental health are associated with each other over time. Our results show that an individual's growth trajectory on health complaints is similar to his or her corresponding growth trajectory on exhaustion across the same period of time. It is possible that there is a causal relationship between the changes in exhaustion and general mental health over time. This would mean that changes in "work-specific" and "context-free" mental health (Warr, 1987) affect each other across time. According to the compensatory control model (Hockey 1993, 1997), in the case of feeling exhaustion, individuals may be exposed to subsequent work demands in a suboptimal state. Therefore, they need to invest compensatory effort to deal with those demands and perform adequately at work. As a consequence, the prolonged compensatory effort results in physiological and psychological costs on health. Conversely, mental health impairment may cause exhaustion. For instance, employees with higher levels of mental health cope with job stressors more effectively and consequently are less likely to experience exhaustion (Maslach et al., 2001; Jenkins & Maslach 1994).

### Strengths and Limitations

Our study has several strengths. First, conducting latent growth curve modeling permitted us to study how the different types of work-related rumination predict trajectories of health outcomes over time. Second, employing a diary design allowed us to assess the level of work-related rumination that people experience particularly during evenings of the working week. Third, including two outcomes of exhaustion and mental health complaints as 'work-specific' and 'context-free' mental health respectively, provided a comprehensive model of employees' well-being. Fourth, by controlling for work pressure and work control, we examined how far the reported work-related rumination during evenings explained changes in health outcomes over time.

As with any study, there are several limitations that should be addressed and considered prior to the interpretation of the findings. First, this research involved only employees who work in a primarily mentally demanding environment; therefore, the generalizability of the findings to industrial workers who has been assumed to experience a different quality of rumination (Pravettoni et al., 2007) is restricted. Second, we used

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paper-and-pencil surveys to collect data that did not provide us an indication of the day and time that participants filled in the diaries. In this study, we decided to use paper-and-pencil surveys in order not to restrict the sample to only those who had Internet access especially in the hours before going to bed. Third, all data were gathered by self-report measures; therefore common method bias may have accounted for the findings. However, the longitudinal design of our research reduced the effects of common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Fourth, in the present study we had a final sample size of 123 participants. Although, a sample size greater than 100 has been suggested as sufficient to reliably estimate linear growth models (Curran, Obeidat, & Losardo, 2010; Fan & Fan, 2005), the power of the latent growth modeling will be enhanced by increasing the sample size (Zhang & Wang, 2009). Furthermore, we had the minimum number of measurement points. Although, growth models typically require at least three repeated measures per individual, it has been documented that the number of measurements plays an important role in the estimation and statistical power of the model (Curran et al., 2010; Zhang & Wang, 2009). In fact, the power of the latent growth modeling increases with a larger numbers of measurement occasions. However, as an exception, Fan and Fan (2005) showed that the number of repeated measures in detecting linear growth had no effect on the statistical power of the latent growth modeling.

### **Practical Implications and Directions for Future Research**

For many people, work nowadays is primarily mentally demanding rather than physically demanding. Moreover, due to advances in communication technologies, the experience of unwinding from work during the time of recovery has become more difficult. Based on the results of this study, organizations are recommended to provide adequate conditions facilitating the recovery process. To do so, it is important not only to facilitate employees in overcoming obstacles to establish detachment but also to enhance their problem-solving skills. According to Nolen-Hoeksema (1996), a successful problem-solving generally occurs in three steps, namely, assessing the problem, evaluating possible solutions to the problem, and finally deciding about which solution to choose. It seems that training skills related to each of these steps may help employees to act as more successful problem solvers during non-work time.

We recommend future research to study the mechanisms by which affective rumination and problem-solving pondering lead to different levels of psychophysiological arousal. For instance, from the cognitive point of view discussed by CATS theory, being mentally engaged with job stressors causes prolonged activation only when individuals experience negative outcome expectancies. Therefore, a study may investigate the different response outcome expectancies that people experience in affective rumination compared to problem-solving pondering. It is also recommended to examine the cumulative effects of work-related rumination on well-being over time. In

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addition, because this study showed that only affective rumination leads to impaired well-being, one may be interested in developing and testing interventions to help employees who ruminate affectively about work-related issues.

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